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WHAT IS *PHYSALIS VARIOVESTITA*?

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In a recent revision of *Physalis* in its United States range, Waterfall (1958) has treated most of the perennial forms with stellate pubescence, including *P. mollis* Nutt. and its varieties, as infraspecific taxa within *P. viscosa* L.¹ This treatment agrees in general with genetic and cytological relationships insofar as they are known (Menzel, 1951, 1957, and unpublished). In regard to this group, Waterfall has retained as a separate species *P. angustifolia* Nutt., which ranges along the northern coast of the Gulf of Mexico, and has distinguished in the Texas population a previously undescribed species, *P. variovestita* Waterfall. The relationships of *P. angustifolia* to *P. viscosa* (*sensu* Rydberg, 1896) have been under study by this investigator (Menzel, 1957) and will be discussed further elsewhere. The purpose of the present note is to record some observations which may bear upon the origin and relationships of *P. variovestita*.

Waterfall's concept of *Physalis variovestita* encompasses plants which are similar to *P. viscosa* ssp. *mollis* (comprising two varieties) but which differ in having abundant long jointed hairs, the hairs simple or branched, in addition to the short, dense, stellate pubescence characteristic of *P. viscosa* ssp. *mollis*. Apparently, it is based upon a single collection. Two collections, from two counties in Texas, are cited in relation to *P. variovestita* as having vestiture approaching the type. Nineteen collections, from fifteen counties in Texas,

¹As treated by Waterfall, *P. viscosa sens. lat.* comprises (exclusive of formae) (1) ssp. *viscosa*; (2) ssp. *maritima*, including var. *maritima*, var. *elliottii*, and var. *spathulaefolia*; (3) ssp. *mollis* with var. *mollis* and var. *cinerascens*.

are cited as "more widely diverging from *P. variovestita*, but with several to few long jointed trichomes present in addition to the short stellate hairs. . .". Waterfall remarks that the existence of a population (?) of *P. variovestita* could perhaps have been predicted on the basis of the intergrades with *P. viscosa* ssp. *mollis* by Anderson's (1949) method of extrapolated correlates.

Observations of the present investigator indicate that there also exists in Texas (and perhaps as far north as Illinois and Indiana) a rare form of *Physalis*, related in a general way to *P. virginiana* Miller, characterized by a very large (to 4-5 cm. broad), pyramidal, many-ribbed but scarcely angled, fruiting calyx, deeply sunken at the base so that the small fruit is suspended in the middle of the greatly inflated calyx. All of the specimens of this form which I have seen with mature fruit had relatively very large seeds (3-4 mm. in diameter), thereby differing from all other perennial *Physalis* species known to me, in which the seed diameter seldom exceeds 2 mm. *A. A. Heller 1756* (UC, NY) is a representative specimen except that the plants are often somewhat hairier, especially on the new growth, the lower part of the stem, and the calyx. Rydberg (1895) cited this collection from Kerr County, Texas in his description of *P. macrophysa* Rydberg. Waterfall has designated one of the NY sheets as lectotype for *P. virginiana* f. *macrophysa* (Rydb.) Waterfall.

In 1950-52, my husband and I made frequent excursions in company with Dr. H. B. Parks to various parts of Brazos County, Texas in order to become acquainted with the local flora, with which Dr. Parks was intimately familiar. In the course of these field trips, observations were made on *Physalis*, and we found forms resembling what is now called *P. variovestita* common in weedy sites in many parts of the County, usually growing intermingled with forms identifiable with *P. mollis* and indistinguishable from the latter except in vestiture. In a few extreme clones, the short stellate pubescence of *P. mollis* was almost entirely replaced by simple and partly glandular hairs.

Having learned of my interest in *P. macrophysa* and in variations in *P. mollis*, Dr. Parks guided me to two remote sites near the Navasota River, known locally as Long Cross-

ing and Democrat Crossing, where interesting *Physalis* populations occurred.

At Long Crossing, about 5 miles east of Curtin and about 3 miles west of the first of a series of bridges across the swamps of the Navasota River, the (nearly impassable) road had been cut through the crest of a hill, the eastern slope of which led down to the river bottom. The cut had exposed a stratum of red clay for a distance of about 15 feet. In the exposed clay was a single clone, comprising several shoots, of *P. macrophysa*. Along the roadside in both directions, and in open woods on either side of the road, in an area about half a mile in radius, was a large population of plants with characters intergrading between *P. mollis* and *P. macrophysa*. In the intergrades, the indument varied from entirely short and stellate to nearly all long and jointed, with various intermediate combinations; seed size ranged from about 1.8 to about 3.5 mm. in diameter; and there was much variation in size and shape of the fruiting calyx. Plants of the *P. macrophysa* clone had rather large campanulate flowers with five large brown spots, reminiscent of *P. virginiana* and some forms of *P. heterophylla* Nees; the flower buds were lanceolate with the calyx lobes exceeding the corolla by 2-3 mm. In *P. mollis* the flowers are usually smaller, more rotate, and purple- or black-spotted, and the buds are ovate, the calyx lobes scarcely exceeding the corolla. The flower characters of *P. macrophysa* appeared occasionally in the intergrades.

At Democrat Crossing a somewhat similar population occurred except that no clone corresponding exactly to *P. macrophysa* was found. Two clones approached it closely, having seeds 3-3.5 mm. in diameter, large fruiting calyces, and lanceolate buds; the pubescence was dense but composed entirely of simple hairs.² One had brown corolla spots, the

²It may be noted that these clones, if isolated as dried specimens from the population in which they occurred, would pass for a rather atypical form of *P. heterophylla*, similar to that noted previously from near Austin, Travis County, Texas (Menzel, 1951, p. 165). Representative specimens are (TEX): Cohn and Barkley 13177; Ferguson April 20, 1901; Tharp April 16, 1927; April 20, 1927; May 5, 1930; M. S. Young May 6, 1917; May 12, 1918. Since *P. mollis* is common in Travis County, and *P. macrophysa* has also been collected there (Tharp May 6, 1931, TEX, also cited by Waterfall), it seems likely that a population of intergrades between *P. mollis* and *P. macrophysa* may exist in this area.

other purple spots. These two clones appeared to be growing on sandy loam in open woods, but a little work with a shovel revealed that their rootstocks were located about six feet below in red clay. This observation is interesting in view of Dr. Parks' impression that *P. macrophysa* occurs only on "Crockett red clay".

It may be added that at both the above locations, as well as elsewhere in Brazos County, the vast majority of intergrades had many more characters in common with *P. mollis* than with *P. macrophysa*. That is to say, they had characteristics varying between *P. variovestita*, as described, and *P. mollis*, with only a few clones having characteristics between *P. variovestita* and *P. macrophysa*. This is scarcely surprising if one assumes a hybrid origin. Since *P. mollis* is common and *P. macrophysa* very rare, backcrosses to *P. mollis* would necessarily be much more frequent unless some special barrier to crossing intervened.

Attempts to transplant pieces of underground stems from the *P. macrophysa* clone and the *P. macrophysa*-like clones from Democrat Crossing to the garden in College Station, Texas, were unsuccessful. A few seeds collected from *P. macrophysa* in 1951 germinated, but the seedlings soon died. On the other hand, no difficulty was experienced in establishing the more *P. mollis*-like intergrades in the garden; indeed, two such clones occurred there naturally as a well established weed, along with several clones of typical *P. mollis*. In 1951, a freshly opened flower was collected from the *P. macrophysa* clone and used to pollinate ten emasculated flowers of one of the "dooryard" clones of *P. mollis*. Three fruits, containing a total of about 15 plump seeds, matured. The seeds, together with a set of herbarium specimens illustrating the intergradation between *P. mollis* and *P. macrophysa*, unfortunately were lost during the vicissitudes of moving from Texas to Florida.

No cytological analysis of *P. macrophysa* was obtained. Metaphase I in eight clones of the intergrades showed that all of the chromosomes were paired, but that the population was highly heterozygous for chromosome interchanges, in

this respect resembling *P. alkekengi* L. (Gottschalk, 1954) and the *P. viscosa-angustifolia* complex in Florida (Menzel, 1957). One of the *P. macrophysa*-like intergrades from Democrat Crossing showed maximum chromosome association of four bivalents and two rings of eight ($2n=24$), the highest heterozygosity for interchanges so far recorded in *Physalis*.

The information available suggests to the present author that there once existed in Texas a rather extensive population of *P. macrophysa* which has now been nearly swamped by the more aggressive *P. mollis*, but whose former range is adumbrated by variability imposed upon *P. mollis* by introgression of *P. macrophysa* genes.

These preliminary observations are reported here in the hope that they may stimulate someone closer to the scene to undertake a further study of the problem in the field.

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LITERATURE CITED

- ANDERSON, EDGAR. 1949. Introgressive Hybridization. New York: John Wiley and Sons.
- GOTTSCHALK, WERNER. 1954. Das auftreten kettenförmiger Chromosomenverbände in der Meiosis verschiedener *Physalis*-Arten. Z. I. A. V. 86: 157-172.
- MENZEL, MARGARET Y. 1951. The Cytotaxonomy and Genetics of *Physalis*. Proc. Am. Phil. Soc. 95: 132-183.
- . 1957. Cytotaxonomic Studies of Florida Coastal Species of *Physalis*. Yrbk. Am. Phil. Soc. 1957: 262-266.
- RYDBERG, P. A. 1895. New Species of *Physalis*. Bull. Torr. Bot. Club 22: 306-308.
- . 1896. The North American species of *Physalis* and Related Genera. Memoirs of the Torr. Bot. Club 4: 297-374.
- WATERFALL, U. T. 1958. A Taxonomic Study of the Genus *Physalis* in North America North of Mexico. Rhodora 60: 107-114, 128-142, 152-173.